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Isabelle Meynial-Salles

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EXAMINER

PAK, YONG D

ART UNIT

PAPER NUMBER

1652

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/585,040	Applicant(s) MEYNIAL-SALLES ET AL.	
	Examiner YONG D. PAK	Art Unit 1652	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-14 and 16-49 is/are pending in the application.
- 4a) Of the above claim(s) 18-21 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-14, 16, 17 and 22-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>6/29/2006</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This application is a 371 of PCT/FR05/00070.

The amendment filed on October 12, 2008, renumbering claims 38-48 as 39-49, has been entered.

Claims 1-14 and 16-49 are pending. Claims 18-21 are withdrawn. Claims 1-14, 16-17 and 22-49 are under consideration.

Election/Restrictions

Applicant's election with traverse of Group I (claims 1-14, 16-17, and 22-49) in the reply filed on October 23, 2008 is acknowledged. The traversal is on the ground(s) (1) that Cameron does not teach the special technical feature, an evolved microorganism claimed in claims 1 and 18 and (2) ISA did not find any lack of Unity of Invention. This is not found persuasive because (1) Cameron does teach an "evolved microorganism" as claimed in claims 1 and 18. Applicants state on page 7 of the Remarks that an "evolved microorganism" arises from the deletion of the *tpiA* gene and at least one gene involved in the conversion of methylglyoxal into lactate. Cameron teaches a microorganism comprising a deletion of the *tipA* gene and deletion of the glyoxalase genes, which is involved in the conversion of the methylglyoxal into lactate. (2) Findings of the ISA are non-binding.

The requirement is still deemed proper and is therefore made FINAL.

Claim for Foreign Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

The information disclosure statement (IDS) submitted on June 29, 2006 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner. The references cited on the IDS of the instant application were previously submitted in its parent application, 09/919,060.

Specification

If applicant desires to claim the benefit of a prior-filed application under 35 U.S.C. 120, a specific reference to the prior-filed application in compliance with 37 CFR 1.78(a) must be included in the first sentence(s) of the specification following the title or in an application data sheet. For benefit claims under 35 U.S.C. 120, 121 or 365(c), the reference must include the relationship (i.e., continuation, divisional, or continuation-in-part) of the applications.

If the instant application is a utility or plant application filed under 35 U.S.C. 111(a) on or after November 29, 2000, the specific reference must be submitted during the pendency of the application and within the later of four months from the actual filing date of the application or sixteen months from the filing date of the prior application. If the application is a utility or plant application which entered the national stage from an international application filed on or after November 29, 2000, after compliance with 35

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U.S.C. 371, the specific reference must be submitted during the pendency of the application and within the later of four months from the date on which the national stage commenced under 35 U.S.C. 371(b) or (f) or sixteen months from the filing date of the prior application. See 37 CFR 1.78(a)(2)(ii) and (a)(5)(ii). This time period is not extendable and a failure to submit the reference required by 35 U.S.C. 119(e) and/or 120, where applicable, within this time period is considered a waiver of any benefit of such prior application(s) under 35 U.S.C. 119(e), 120, 121 and 365(c). A benefit claim filed after the required time period may be accepted if it is accompanied by a grantable petition to accept an unintentionally delayed benefit claim under 35 U.S.C. 119(e), 120, 121 and 365(c). The petition must be accompanied by (1) the reference required by 35 U.S.C. 120 or 119(e) and 37 CFR 1.78(a)(2) or (a)(5) to the prior application (unless previously submitted), (2) a surcharge under 37 CFR 1.17(t), and (3) a statement that the entire delay between the date the claim was due under 37 CFR 1.78(a)(2) or (a)(5) and the date the claim was filed was unintentional. The Director may require additional information where there is a question whether the delay was unintentional. The petition should be addressed to: Mail Stop Petition, Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

If the reference to the prior application was previously submitted within the time period set forth in 37 CFR 1.78(a), but not in the first sentence(s) of the specification or an application data sheet (ADS) as required by 37 CFR 1.78(a) (e.g., if the reference was submitted in an oath or declaration or the application transmittal letter), and the information concerning the benefit claim was recognized by the Office as shown by its

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inclusion on the first filing receipt, the petition under 37 CFR 1.78(a) and the surcharge under 37 CFR 1.17(t) are not required. Applicant is still required to submit the reference in compliance with 37 CFR 1.78(a) by filing an amendment to the first sentence(s) of the specification or an ADS. See MPEP § 201.11.

The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code, page 7, for example. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01. Applicant's cooperation is requested in reviewing the specification for additional hyperlinks that may be present in the specification and making the appropriate correction(s).

Claim Objections

Claims 1, 16, 17, 22, and 46 are objected to because of the following informalities:

Claims 1, 16, 17, 22, and 46 are missing articles "A" or "The". Appropriate correction is required.

Claim 1 recites the phrase "evolved_micro-organisms". The underscore should be removed. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 10, 12, and 16 and claims 2-14, 17, and 32-49 depending therefrom are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 10, 12, and 16, recite the phrases “Evolved microorganisms”, “cause evolution”, “evolved genes”, and “Evolved strain”. The metes and bounds of these phrase sin the context of the above claims are not clear to the Examiner. Evolution is the change in genetic composition of an organism from one generation to the next. Therefore, it is not clear how the “initial strain” comprising deletion of *tpiA* gene and a gene involved in conversion of methylglyoxal into lactate causes "evolution" or “evolved genes” in the same “initial strain”. Examiner requests clarification of the above phrase.

Claims 1 and 12 and claims 2-13, 14, 17, and 32-49 depending therefrom are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1 and 12 recite the phrase “improved” activity. The metes and bounds of the phrase in the context of the above claims are not clear to the Examiner. It is not clear to

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the Examiner as to how much of an increased in the enzyme's 1,2-propanediol synthase activity or acetone synthase activity is considered as being "improved" by the applicants. A perusal of the specification did not provide a clear definition for the above phrase. Without a clear definition in terms of numerical value, those skilled in the art would be unable to conclude what is considered as having "improved" activity. Further, claims 1 and 12 recite "acetone synthase" and "1,2-propanediol synthase" in quotations. It is not clear to the Examiner what the outstations are emphasizing; whether the evolved strain has improved 1,2-propanediol synthase activity or improved synthesis of 1,2-propanediol. For examination purposes, the examiner has interpreted the claims as evolved strains having improved synthesis of 1,2-propanediol. However, if applicants' intended meaning of the phrase is different from the examiner's interpretations as stated above, applicants are requested to so state and clarify the record.

Claims 4, 7-10, 26-29, and 35-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 4, 7-10, 26-29, and 35-39 recite the phrase "favours". The metes and bounds of the phrase in the context of the above claim are not clear to the Examiner. It is not clear to the Examiner as to how much of an enzyme's activity towards conversion of pyruvate to acetate, for example, is considered as being "favored" by the applicants. A perusal of the specification did not provide a clear definition for the above phrase.

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Without a clear definition in terms of numerical value, those skilled in the art would be unable to conclude what constitutes “favours”.

Claims 6 and 27 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 6 and 27 recite the phrase “low sensitivity to inhibition by NADH”. The metes and bounds of the phrase in the context of the above claims are not clear to the Examiner. It is not clear to the Examiner as to how much inhibition by NADH is considered as having “low sensitivity” by the applicants. A perusal of the specification did not provide a clear definition for the above phrase. Without a clear definition in terms of numerical value, those skilled in the art would be unable to conclude what is considered as having “low sensitivity”.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1-14, 16-17, and 22-49 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 1-14, 16-17, and 22-49 are drawn to a strain of evolved microorganism, bacterium, yeast, fungus, *Escherichia* and *Corynebacterium* comprising **(A)** a deletion of the *tpiA* gene and deletion of at least one gene involved in conversion of methylglyoxal into lactate or deletion of *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd*, wherein said strain having an improved synthesis of 1,2-propanediol, **(B)** said strain of (A) comprising exogenous genes encoding enzymes that favor the metabolism of pyruvate to acetate and/or pyruvate to acetyl-CoA and NADH, **(C)** said strain of (A) comprising exogenous genes encoding an enzymes that are involved in the conversion of acetyl—oA and acetate into acetone, and **(D)** a method of preparing said strain of (A), (B) or (C). Therefore, these claims encompass a strain of any or all microorganism, bacterium, yeast, fungus, *Escherichia* and *Corynebacterium* comprising **(A)** a deletion of the *tpiA* gene and deletion of any or all genes involved in conversion of methylglyoxal into lactate or deletion of *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd*, wherein said strain having an improved synthesis of 1,2-propanediol, **(B)** said strain of (A) comprising any or all genes encoding enzymes that favors the metabolism of pyruvate to acetate and/or pyruvate to acetyl-CoA and NADH, **(C)** said strain of (A) comprising any or all exogenous genes encoding an enzymes that are involved in the conversion of acetyl—oA and acetate into acetone, and **(D)** a method of preparing said strain of (A), (B) or (C). Therefore, these claims are drawn to a genus of any or all microorganism, bacterium, yeast, fungus, *Escherichia* and *Corynebacterium* comprising a deletion of the *tpiA* and any gene involved in conversion of methylglyoxal into lactate, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* and comprising any or all exogenous genes encoding

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enzymes that favors the metabolism of pyruvate to acetate, acetyl-CoA and NADH and any or all exogenous genes encoding an enzymes that are involved in the conversion of acetyl-CoA and acetate into acetone, wherein said strain has an improved synthesis of 1,2-propanediol. The specification describes an *E. coli* comprising deletions of its *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd*, wherein said *E. coli* has improved 1,2-propanediol synthesis. However, the specification does not provide an actual reduction to practice of the claimed microorganism because the specification fails to disclose (1) the structure of *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd*, genes in non-*E. coli*, which must be known in order to inactivate said genes in the claimed microorganism, (2) the structure of genes encoding enzymes that favors the metabolism of pyruvate to acetate, acetyl-CoA and NADH and (3) the structure of genes encoding an enzymes that are involved in the conversion of acetyl-CoA and acetate into acetone, wherein said claimed microorganism comprises any or all microorganism, bacterium, yeast, fungus, *Escherichia* and *Corynebacterium*, wherein its *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* genes are deleted and expresses any or all exogenous genes encoding enzymes that favors the metabolism of pyruvate to acetate, acetyl-CoA and NADH and any or all exogenous genes encoding an enzymes that are involved in the conversion of acetyl-CoA and acetate into acetone. The specification does not disclose the isolation or cloning of any non-*E. coli* *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd*, genes. The specification does not describe any structural features of non-*E. coli* *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd*, genes that would have been expected to be shared by other any or

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all microorganism, bacterium, yeast, fungus, *Escherichia* and *Corynebacterium tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* genes. The level of knowledge and skill in the art does not allow those skilled in the art to structurally envisage or recognize any or all microorganism, bacterium, yeast, fungus, *Escherichia* and *Corynebacterium tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* genes and any or all exogenous genes encoding enzymes that favors the metabolism of pyruvate to acetate, acetyl-CoA and NADH and any or all exogenous genes encoding an enzymes that are involved in the conversion of acetyl-CoA and acetate into acetone because it is known that corresponding genes in different species tend to differ in sequence and the amount and type of sequence variation is unpredictable. Since the structure of the *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* genes would be expected to vary unpredictable from the structure of *E. coli tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* genes, the disclosed *E. coli* strain comprising deletion of its *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* do not constitute a representative number of species to describe the whole genus of any or all microorganism, bacterium, yeast, fungus, *Escherichia* and *Corynebacterium* comprising deletion of *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* genes and there is no evidence on the record of the relationship between the structure of the disclosed *E. coli* strain and the structure of any or all microorganism, bacterium, yeast, fungus, *Escherichia* and *Corynebacterium* comprising deletion of *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* genes and expressing any or all exogenous genes encoding enzymes that favors the metabolism of pyruvate to acetate, acetyl-CoA and NADH and any or all exogenous

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genes encoding an enzymes that are involved in the conversion of acetyl-CoA and acetate into acetone. Because the *E. coli* strain comprising deletion of its *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* genes is not representative of the entire claimed genus, and the specification does not disclose structural features shared by members of the genus, the description of the modified *E. coli* comprising deletion of its *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* genes and expressing any or all exogenous genes encoding enzymes that favors the metabolism of pyruvate to acetate, acetyl-CoA and NADH and any or all exogenous genes encoding an enzymes that are involved in the conversion of acetyl-CoA and acetate into acetone would not have put the application in possession of the common structural attributes or features shared by members of the genus that structurally distinguish the members of the genus from other materials at the time of filing. Thus, the description of the *E. coli* comprising deletion of its *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* genes is not sufficient to describe the claimed genus of any or all microorganism, bacterium, yeast, fungus, *Escherichia* and *Corynebacterium* comprising deletion of its *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* genes and expressing any or all exogenous genes encoding enzymes that favors the metabolism of pyruvate to acetate, acetyl-CoA and NADH and any or all exogenous genes encoding an enzymes that are involved in the conversion of acetyl-CoA and acetate into acetone. Accordingly, the specification does not provide a representative number of species or sufficient common structural features to show that the application would have been in possession of the claimed genus as a whole at the time of filing. Therefore, the specification fails to describe a

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representative species of the genus comprising any or all yeast or genus comprising any or all microorganism, bacterium, yeast, fungus, *Escherichia* and *Corynebacterium* comprising comprising deletion of its *tpiA*, *gloA*, *aldA*, *aldB*, *ldhA*, *pflA*, *pflB*, *adhE*, and/or *edd* genes and expressing any or all exogenous genes encoding enzymes that favors the metabolism of pyruvate to acetate, acetyl-CoA and NADH and any or all exogenous genes encoding an enzymes that are involved in the conversion of acetyl-CoA and acetate into acetone.

Given this lack of description of the representative species encompassed by the genus of the claims, the specification fails to sufficiently describe the claimed invention in such full, clear, concise, and exact terms that a skilled artisan would recognize that applicants were in possession of the inventions of claims 1-14, 16-17, and 22-49

Applicant is referred to the revised guidelines concerning compliance with the written description requirement of U.S.C. 112, first paragraph, published in the Official Gazette and also available at www.uspto.gov.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-3, 5-9, 13-14, 16, 22-24, 26-33, 35-39, and 42-43 are rejected under 35 U.S.C. 102(b) as being anticipated by Cameron et al.

Claims 1-3, 5-9, 13-14, 16, 22-24, 26-33, 35-39, and 42-43 are drawn to an *E. coli* comprising a deletion of its *tpiA* and *gloA* genes and comprising evolved endogenous genes encoding enzymes that favor the metabolism of pyruvate to acetate and/or pyruvate to acetyl-CoA and NADH, wherein said *E. coli* has improved 1,2-propanediol synthesis, and a method of producing said *E. coli*.

Cameron et al. (US Patent No. 6,303,352 B1 – cited previously on form PTO-892) discloses an *E. coli* comprising a deletion of its *tpiA* and *gloA* genes, wherein said *E. coli* has improved 1,2-propanediol synthesis, and a method of producing said *E. coli* (Column 6, lines 16-42 and Figure 1). Examiner takes the position that the *E. Coli* of Cameron et al. inherently possesses the same material structure and functional characteristics as the enzyme of the instant invention since (1) applicants state on page 7 of the Remarks that an “evolved microorganism” (microorganism comprising evolved genes that favor the metabolism of pyruvate to acetate and/or pyruvate to acetyl-CoA and NADH) arises from the deletion of the *tpiA* gene and at least one gene involved in the conversion of methylglyoxal into lactate and the *E. Coli* Cameron et al. comprises a deletion of the *tipA* gene and deletion of the glyoxalase genes, which is involved in the conversion of the methylglyoxal into lactate, and (2) the Office does not have facilities for examining and comparing applicant’s enzyme with the enzyme of the prior art, the burden is on the applicant to show a novel or unobvious difference between the claimed product and the product of the prior art (i.e., that the mutant *E. coli* of the prior art does not possess the same material structure and functional characteristics of the claimed *E. coli*). See *In re Best*, 562 F.2d 1252, 195 USPQ 430 (CCPA 1977) and *In re Fitzgerald*

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et al., 205 USPQ 594. Therefore, the reference of Cameron et al. anticipates claims 1-3, 5-9, 13-14, 16, 22-24, 26-33, 35-39, and 42-43.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 4, 10-12, 25, 34, 40-41, and 46-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over Cameron et al. as applied to claims 1-3, 5-9, 13-14, 16, 22-24, 26-33, 35-39, and 42-43 above, and further in view of Altaras et al. and Bermejo et al.

Claims 4, 10-12, 25, 34, 40-41, and 46-49 are drawn to an *E. coli* comprising a deletion of its *tpiA*, *gloA*, and *ldhA* genes and comprising evolved endogenous genes

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encoding enzymes that favor the metabolism of pyruvate to acetate and/or pyruvate to acetyl-CoA and NADH and a heterologous gene encoding an enzyme that favors production of acetone, wherein said *E. coli* has improved 1,2-propanediol synthesis, and a method of producing said *E. coli*.

Cameron et al. (US Patent No. 6,303,352 B1 – cited previously on form PTO-892) discloses an *E. coli* comprising a deletion of its *tpiA* and *gloA* genes and comprising evolved endogenous genes encoding enzymes that favor the metabolism of pyruvate to acetate and/or pyruvate to acetyl-CoA and NADH, wherein said *E. coli* has improved 1,2-propanediol synthesis, and a method of producing said *E. coli*, as discussed above.

The difference between the reference of Cameron et al. and the instant invention is that the reference of Cameron et al. does not teach deletion of *ldhA* and expression of *C. acetobutylicum* gene encoding an enzyme that favors production of acetone.

Altaras et al. (Biotechnol. Prog. 16:940-946 - form PTO-1449) discloses enhanced production of 1,2-propanediol by deleting *ldhA* gene in *E. coli* (abstract and page 940). Altaras et al. teaches that elimination of the byproduct, lactate, increases production of 1,2-propanediol (abstract and page 940).

Bermejo et al. (Appl Environ Microbiol. 1998 Mar;64(3):1079-85 - form PTO-892) discloses expression of *C. acetobutylicum* gene encoding an enzyme that favors production of acetone in *E. coli* in order to improve solvent production (page 936).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to alter the *E. coli* of Cameron et al. by also deleting its

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ldhA gene and expressing a *C. acetobutylicum* gene encoding an enzyme that favors production of acetone. One of ordinary skill in the art at the time the invention was made would have been motivated to do the above for the purpose of eliminating production of the byproduct, lactate, and in order to increase production of 1,2-propanediol. One of ordinary skill in the art at the time the invention was made would have had a reasonable expectation for success Altaras et al. teaches deletion of *ldhA* gene in *E. coli*, which results in increased production of 1,2-propanediol and Bermejo et al. teaches expression of a *C. acetobutylicum* gene encoding an enzyme that favors production of acetone.

Therefore, the above references render claims 4, 10-12, 25, 34, 40-41, and 46-49 *prima facie* obvious.

Conclusion

None of the claims are in condition for allowance.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yong Pak whose telephone number is 571-272-0935. The examiner can normally be reached 6:30 A.M. to 5:00 P.M. Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nashaat Nashed can be reached on 571-272-0934. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-1600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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/Yong D Pak/
Primary Examiner, Art Unit 1652